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(54) **GRAPHENE OXIDE NANOPARTICLE COMPOSITIONS AND METHODS OF MAKING THE SAME**

(57) Water soluble graphene oxide nanoparticles (GO) are provided having graphene sheets containing carboxylic and hydroxyl groups. The diameter of the GO when present in a closed form ranges from about 40nm to 120nm. Eco-friendly methods are provided for producing the GO. Methods for reversible encapsulation of a molecule within water soluble carbon nanoparticles (wsCNP) including the GO nanoparticles are provided that allow for delivery of the wsCNP loaded with therapeutic and/or imaging agents to a subject in need by releasing the therapeutic/imaging agent upon an increase in pH above about 7.2. The wsCNP have been shown to cross the blood brain barrier in a mouse model of vascular dementia, and methods are provided for delivering the wsCNP loaded with a therapeutic and/or imaging molecule to the brain.

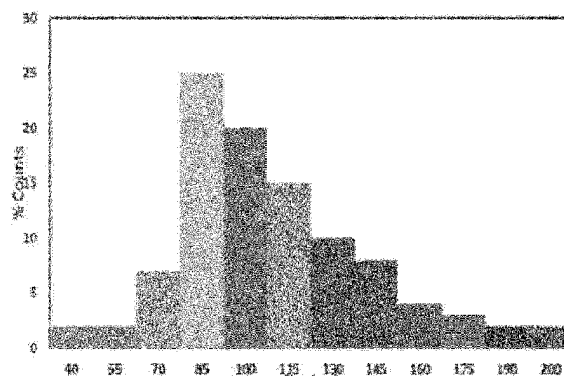


FIG. 1A

**PARTIAL EUROPEAN SEARCH REPORT**

Application Number

under Rule 62a and/or 63 of the European Patent Convention.
This report shall be considered, for the purposes of
subsequent proceedings, as the European search report

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DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	MITRAJIT GHOSH ET AL: "Carbon Nano-onions for Imaging the Life Cycle of Drosophila Melanogaster", SMALL, vol. 7, no. 22, 18 November 2011 (2011-11-18), pages 3170-3177, XP055544530, DE ISSN: 1613-6810, DOI: 10.1002/smll.201101158 * page 3171, right-hand column, paragraph 2 - page 3173, left-hand column, paragraph 1; figures 1, 2 * * page 3175, left-hand column, paragraph 1 - page 3176, left-hand column, paragraph 1 * ----- -/--	1-5,14, 15	INV. C01B32/23
			TECHNICAL FIELDS SEARCHED (IPC)
			C01B
INCOMPLETE SEARCH			
The Search Division considers that the present application, or one or more of its claims, does/do not comply with the EPC so that only a partial search (R.62a, 63) has been carried out.			
Claims searched completely :			
Claims searched incompletely :			
Claims not searched :			
Reason for the limitation of the search: see sheet C			
Place of search		Date of completion of the search	Examiner
The Hague		22 January 2019	Sevillano Rodriguez
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

EPO FORM 1503 03.82 (P04E07)



PARTIAL EUROPEAN SEARCH REPORT

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DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (IPC)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
A	<p>JINGQUAN LIU ET AL: "Graphene and graphene oxide as new nanocarriers for drug delivery applications", ACTA BIOMATERIALIA, vol. 9, no. 12, 1 December 2013 (2013-12-01), pages 9243-9257, XP055282428, AMSTERDAM, NL ISSN: 1742-7061, DOI: 10.1016/j.actbio.2013.08.016 * page 9245, right-hand column, paragraph 1 - page 9247, right-hand column, paragraph 1 * * page 9247, right-hand column, paragraph 2 - page 9248, right-hand column, paragraph 1; figure 1 * * page 9250, right-hand column, paragraph 2 *</p> <p>-----</p>	1-5,14,15	TECHNICAL FIELDS SEARCHED (IPC)
A	<p>SUMIT KUMAR SONKAR ET AL: "Carbon Nano-Onions as Nontoxic and High-Fluorescence Bioimaging Agent in Food Chain-An <I>In Vivo</I> Study from Unicellular <I>E. coli</I> to Multicellular <I>C. elegans</I>", MATERIALS EXPRESS, vol. 2, no. 2, 1 June 2012 (2012-06-01), pages 105-114, XP055544674, ISSN: 2158-5849, DOI: 10.1166/mex.2012.1064 * page 106, left-hand column, paragraph 5 * * page 108, left-hand column, paragraph 2; figures 1, 4 *</p> <p>-----</p> <p>-/--</p>	1-5,14,15	

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EPO FORM 1503 03.82 (P04C10)

**INCOMPLETE SEARCH
SHEET C**

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Claim(s) completely searchable:
1-5, 9-15

Claim(s) searched incompletely:
14, 15

Claim(s) not searched:
6-8

Reason for the limitation of the search:

As already indicated in the clarification request dated 05-10-2018, the present application contains 15 claims, of which 1, 6, 9 and 11 are independent. There is no clear distinction between the independent claims because of overlapping scope. There are so many claims and they are drafted in such a way that the claims as a whole do not comply with the provisions of clarity and conciseness in Article 84 EPC, as it is particularly burdensome for a skilled person to establish the subject-matter for which protection is sought. Non-compliance with the substantive provisions is such that a meaningful search of the whole claimed subject-matter could/can not be carried out (Rule 63 EPC and Guidelines B-VIII, 3).

The search has been restricted to the subject-matter indicated by the applicant in his letter of 17-12-2018 filed in reply to the invitation pursuant to Rule 62a(1) and/or Rule 63(1) EPC. The applicant has indicated that the search should be carried out on independent claims 1 and 9 with their corresponding dependent claims 2-5 and 11-15.



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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1-5, 14, 15

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

**LACK OF UNITY OF INVENTION
SHEET B**

Application Number

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The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-5, 14, 15

A material comprising graphene oxide nanoparticles

2. claims: 9-13

A method for reversible encapsulation of a molecule within a water soluble carbon nanoparticle
